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First Named Inventor	RICHARDS, Ray
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ENCLOSURES ***(check all that apply)***

- ☐ Fee Transmittal Form
  - ☐ Fee Attached
- ☐ Amendment / Reply
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- ☐ Extension of Time Request
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Remarks

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SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	BERESKIN & PARR
Signature	Tony R. Orsi, Reg. No. 55,831
Date	March 2, 2004

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March 2, 2004

Tony R. Orsi
B.A.Sc., M.A.Sc. (Elec. Eng.)
416 957 1603 torsi@bereskinparr.com

Your Reference: 10/050,591
Our Reference: 9250-2

Certified Copy of Priority Document

Honorable Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

Re: United States Patent Application No. 10/050,591
For: AIRCRAFT AND WATERCRAFT ADAPTED TO FLOAT ON MAIN WING
Applicant: RICHARDS, Ray
Filed: January 18, 2002
Group Art Unit: 3643

This correspondence is responsive to the Office Action mailed October 2, 2003, in the above-identified patent application. As required, we enclose herewith a certified copy of the Canadian application, 2,331,944, to perfect the priority claim under 35 U.S.C. 119(b). If required, please charge any deficiency or credit any overpayment to our deposit account no. 02-2095.

Yours truly,

Tony Orsi

Tony R. Orsi
Registration No. 55,831
AT / cec
Encl.

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La présente atteste que les documents ci-joints, dont la liste figure ci-dessous, sont des copies authentiques des documents déposés au Bureau des brevets.

Canadian Patent Office

Certification

This is to certify that the documents attached hereto and identified below are true copies of the documents on file in the Patent Office.

Specification and Drawings, as originally filed, with Application for Patent Serial No: **2,331,944,** on January 19, 2001, by **RAY RICHARDS,** for "Seaplane Having Main Wing Mounted Beneath Fuselage".

Tracy Paulhus

Agent certificateur/Certifying Officer

July 23, 2003

Date

Canada

(CIPO 68)
04-09-02

OPIC CIPO

This invention relates to seaplanes and more particularly to a seaplane in which the main wing and the horizontal stabilizer or tailplane support the aircraft when it is in water.

Various flotation means are used to support a seaplane when it is on water. The most usual means are floats or pontoons but in some aircraft such as flying-boats, a portion of their fuselage as well as outboard floats are used to support them on water.

The pontoons and floats of conventional float-planes detrimentally affect the operation of the craft in a number of ways: first the pontoons and floats constitute a substantial aerodynamic drag when the aircraft is taking off and when the aircraft is in the air and secondly the air speed of the aircraft and its fuel efficiency are detrimentally affected by such drag.

Flying-boats which are supported by their fuselage as well as by pontoons and floats also have substantial drag due to the floats attached to their wings. There is however another source of drag which is due to so called "shed-vortex" drag associated with the hydrodynamic "step" located on the

bottom of their fuselages.

The step allows the aircraft to break water suction forces and to become "unstuck" and to lift off the water once sufficient speed has been attained. As much as 50 percent of the overall drag of a standard flying-boat or a float-plane is attributable to the shed-vortex drag of this step.

I have designed a seaplane that can be supported on water by its main wing and by the horizontal stabilizer of its tail. The fuselage of the aircraft is completely out of the water. When the craft has sufficient forward speed in water, the main wing begins to plane on its lower surface and continues planing until lift-off occurs at the appropriate speed. The horizontal stabilizer and the remainder of the tail of the aircraft are out of the water at this time.

My seaplane lacks the "step" of a conventional flying-boat and float-plane. The aft portion of the fuselage is not a hull providing flotation but simply provides support for the horizontal and vertical stabilizers. This aft portion is well clear of the water and rotation at takeoff speed does not place any part of the fuselage in the water. The trailing edge of the root of the main wing serves the same function as the

step but without an aerodynamic drag beyond that normally provided by the wing.

The structure of my seaplane is much simpler than that of a conventional flying-boat. Since its fuselage is completely out of the water, no special aerodynamic shapes are needed such as in flying-boats for operation on water. As a result there is much less overall aerodynamic drag of my fuselage than that of conventional flying-boats.

My seaplane comprises a fuselage and propulsion means. The seaplane also has a main wing and a horizontal stabilizer each having leading and trailing edges. The trailing edge of the main wing is immovable relative to the leading edge thereof. The main wing has a central portion located beneath the fuselage and distal portions which extend outwardly from opposite sides of the fuselage. The seaplane has a centre of gravity located on a vertical line which extends upwardly from the trailing edge of the main wing and which passes through the fuselage. The horizontal stabilizer is composed of two sections each extending outwardly from opposite sides of the fuselage and each having an elevon. The seaplane has means for causing each elevon to pivot independently of the other.

A preferred feature of the main wing is that it has a dihedral shape. Its lower wall is made up of two plane faces which meet beneath the fuselage at an obtuse angle. The line of intersection of the two plane faces is generally referred to as a "root". The wing is symmetrically disposed about the fuselage and its dihedral angle is about 15 degrees. The wing is thus "V" shaped in cross-section.

The "V" shape provides a water-planing surface for aircraft at planing speeds in exactly the same way that a "V" hull of a motorboat does. The "V" hull is known to provide the smoothest ride in rough water over other shapes. The bottom surface of the main wing therefore provides the only hydrodynamic surface required for water-planing at high speed and it does this without any compromise in the required aerodynamic shape of the main wing.

A "V" shape provides the lowest drag possible and permits the aircraft to execute sharp banked turns while in the water, in most cases, as easily as a motor boat.

Another preferred feature of the main wing is that it is formed as a single piece and lacks aerodynamic drag-producing devices such as pontoons, wing-mounted lateral-stabilizing floats, special shaped hulls and the additional hydrodynamic

"step" common to standard flying-boats. As a result the wing has a significantly lower overall aerodynamic drag coefficient, is lighter, more water-tight and cheaper of construction than conventional wings.

The trailing edge of the main wing at the root provides a high-speed planing surface and in effect is a so-called "step" for my seaplane. This step provides a sharp discontinuity to utilize the Coanda effect to break water suction forces and hence to allow rotation at takeoff speed and subsequent flight. Utilizing the trailing edge of the main wing in this way eliminates the need to provide an additional step as required in traditional flying-boats which suffer the attendant aerodynamic drag losses.

A preferred embodiment of the seaplane of my invention is described with reference to the accompanying drawings in which:

Figure 1 is an elevation of the seaplane;

Figure 2 is a plan view of the seaplane;

Figure 3 is an elevation of the seaplane from the front;

Figure 4 is an elevation of the side of the seaplane.

Like reference characters refer to like parts throughout

the description of the drawings.

With reference to Figure, 1, the seaplane of the invention, generally 10, has a fuselage 12, a main wing 14 and a tail having a horizontal stabilizer 16 and a vertical stabilizer 18. The vertical stabilizer has a rudder 20 while the horizontal stabilizer has two elevons 22,24 disposed side by side and on opposite sides of the plane of symmetry 26 of the aircraft.

Mounted on the top of the fuselage is a stub wing 30 and at the ends of the wing, engines 32, 34 are mounted. The stub wing optionally has control surfaces with blown flaps. The flaps are located in the slip stream of the propellers and serve to enhance lift of the aircraft when travelling at relatively low speed.

With reference to Figures 2 and 3, the main wing 14 is dihedral and has a root 40 which is located beneath the fuselage 12 and which lies in the plane of symmetry 24 of the aircraft. The wing has distal portions 42, 44 which extend outwardly from opposite side of the root at a dihedral angle 46 of about 15 degrees.

The main wing has leading and trailing edges 50, 52. The wing is a single piece and lacks aerodynamic drag-producing devices such as pontoons, wing-mounted later-stabilizing floats, specially shaped hulls and a hydrodynamic step surfaces found on the main wing of a conventional aircraft. The trailing edge of the main wing is immovable relative to its leading edge.

During takeoff the main wing is used as a surface-piercing hydrofoil to achieve a large lift force once the aircraft is underway and until hydrodynamic planing is achieved on the bottom surface of the main wing at higher speed.

With reference to Figure 2, each elevon 22, 24 pivots independently of the other and not together as a unit. Such elevons provide differential and non-differential water-braking to assist the execution of turns and braking to a stop for the aircraft.

The elevons also provide an alternate source of low-speed propulsion to the aircraft in the case of engine failure. Such propulsion is achieved by manually causing one elevon to pivot upward and downward while at the same time causing the other to pivot in the opposite directions. Movement of the elevons

in this manner produces a flipper like action in the water with resulting forward movement of the aircraft.

In traditional float-equipped seaplanes, retractable rudders are incorporated on the rear end of each float to allow steering of the craft while travelling at low speed on water. During takeoff and landing, the pilot must ensure that these rudders are in the retracted position otherwise he may lose heading control of the craft. The craft may even overturn during takeoff and landing should these rudders not be retracted at this time. My aircraft does not have this problem because the elevons are used to heading control at low speed but are completely out of the water while the aircraft is planing at high speed during takeoff and landing.

The aircraft is constructed such that its centre of gravity is located in the plane of symmetry 26 of the aircraft and vertically above the trailing edge 50 of the main wing. As a result the centre of hydrodynamic pressure is ahead of the centre of gravity at all times thereby preventing unbalanced nose-over moments from occurring during takeoff and landing.

The main wing and horizontal stabilizer provide displacement flotation buoyancy for the aircraft while keeping

the fuselage completely out of the water.

Preferably the main wing is mounted very low and the horizontal stabilizer has a relatively large area. In such case, the seaplane will be capable of flying close to the water in ground effect and also, unlike most conventional ground effect seaplanes, be capable of climbing rapidly to and flying at high altitudes.

My seaplane can be converted to an amphibious craft by the addition of a wheel on the nose of the fuselage and wheels to the fuselage aft of the centre of gravity of the craft.

It will be understood of course that modifications can be made in the structure of the aircraft of the subject invention without departing from the scope and purview of the invention as described herein.

I claim:

1. A seaplane comprising: a fuselage having a plane of symmetry; propulsion means; main wing and horizontal stabilizer each having leading and trailing edges, the trailing edge of said main wing being immovable relative to the leading edge thereof, said main wing having a central portion located beneath said fuselage and distal portions which extend outwardly from opposite sides of said fuselage, said seaplane having a centre of gravity located on a vertical line which extends vertically upwardly from the trailing edge of said main wing and which passes through said plane of symmetry, said horizontal stabilizer being composed of two sections each extending outwardly from opposite sides of said fuselage and each having an elevon in the trailing edge thereof; and means for causing each said elevon to pivot independently of the other said elevon.

2. The aircraft as claimed in claim 1 wherein said main wing is dihedral.

3. The aircraft as claimed in claim 1 wherein said propulsion means is located above said main wing.

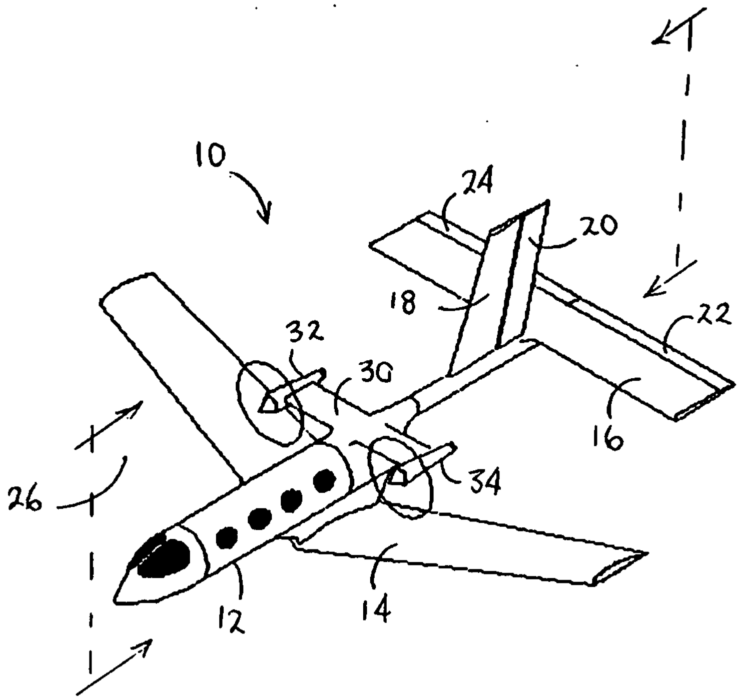

FIG.1.

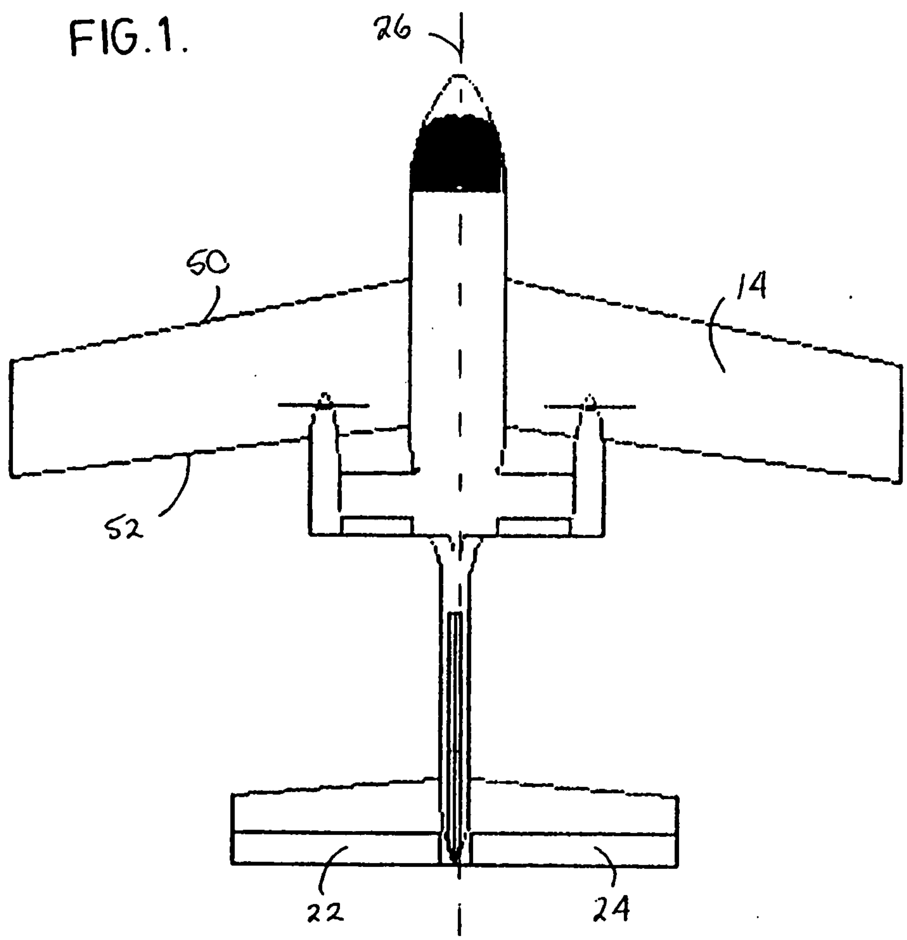

FIG. 2.

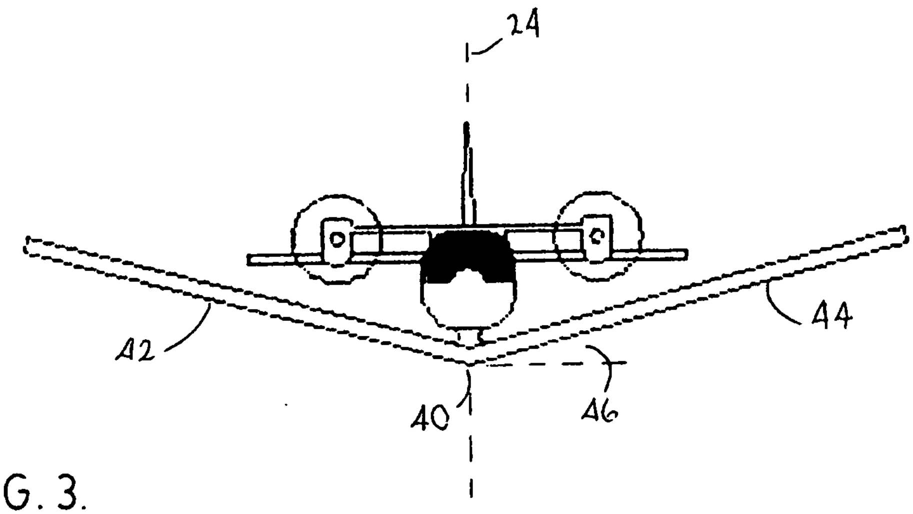

FIG. 3.

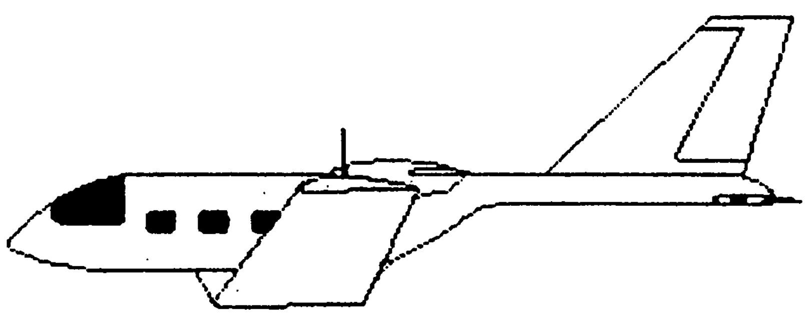

FIG. 4.